Package ‘clda’

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**Title**  Convolution-Based Linear Discriminant Analysis

**Version**  0.1

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**Depends**  R (>= 3.1.0)

**Description**  Contains a time series classification method that obtains a set of filters that maximize the between-class and minimize the within-class distances.

**License**  GPL (>= 3)

**Encoding**  UTF-8

**LazyData**  true

**RoxygenNote**  7.1.0

**Imports**  stats, MASS

**NeedsCompilation**  no

**Repository**  CRAN

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**R topics documented:**

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clda.classify

cLDA classify

Description
Classify the time series and obtain the distances between the time series and the centroids of each class.

Usage

clda.classify(model, Data)

Arguments

model An object returned by the function clda.model.

Data Matrix of time series on the rows.

Value
A list containing the predicted labels of the time series and a matrix of distances between the time series and the centroids after applying the filters obtained by clda.model.

Author(s)
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See Also
clda.model

Examples

```r
## Generating 200 time series of length 100 with label 1
time_series_signal_1 = sin(matrix(runif(200*100),nrow = 200,ncol = 100))
time_series_error_1 = matrix(rnorm(200*100),nrow = 200,ncol = 100)
time_series_w_label_1 = time_series_signal_1 + time_series_error_1

## Generating another 200 time series of length 100 with label 2
time_series_signal_2 = cos(matrix(runif(200*100),nrow = 200,ncol = 100))
time_series_error_2 = matrix(rnorm(200*100),nrow = 200,ncol = 100)
time_series_w_label_2 = time_series_signal_2 + time_series_error_2

## Join the time series data in one matrix
time_series_data = rbind(time_series_w_label_1,time_series_w_label_2)
label_time_series = c(rep(1,200),rep(2,200))
clda_model <- clda.model(time_series_data,label_time_series)
```

## Create a test set

```r
## data with label 1
```
\begin{verbatim}
Data_test_label_1 = sin(matrix(runif(50*100),nrow = 50,ncol = 100))
## data with label 2
Data_test_label_2 = cos(matrix(runif(50*100),nrow = 50,ncol = 100))
## join data into a single matrix
Data_test = rbind(Data_test_label_1,Data_test_label_2)
## obtain the labels and distances of each time series
clda.classify(clda_model,Data_test)
\end{verbatim}

\textbf{clda.model}  \hspace{1cm}  \textit{cLDA Model}

\textbf{Description}

Obtains a set of filters for labeled time series data so that the between-class distances are maximized, and the within-class distances are minimized.

\textbf{Usage}

clda.model(Data, Labels)

\textbf{Arguments}

- \textbf{Data} \hspace{1cm} Matrix of time series on the rows.
- \textbf{Labels} \hspace{1cm} Label of each time series.

\textbf{Value}

A list containing the filters and their respective importance (g and eig_val), the class means (Means), the average of the class means (Mean), and the labels of each class mean (classes). The filters are the columns of the matrix g.

\textbf{Author(s)}

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\textbf{Examples}

\begin{verbatim}
## Generating 200 time series of length 100 with label 1
time_series_signal_1 = sin(matrix(runif(200*100),nrow = 200,ncol = 100))
time_series_error_1 = matrix(rnorm(200*100),nrow = 200,ncol = 100)
time_series_w_label_1 = time_series_signal_1 + time_series_error_1
## Generating another 200 time series of length 100 with label 2
time_series_signal_2 = cos(matrix(runif(200*100),nrow = 200,ncol = 100))
time_series_error_2 = matrix(rnorm(200*100),nrow = 200,ncol = 100)
time_series_w_label_2 = time_series_signal_2 + time_series_error_2
## Join the time series data in one matrix
time_series_data = rbind(time_series_w_label_1,time_series_w_label_2)
label_time_series = c(rep(1,200),rep(2,200))
\end{verbatim}
## obtain the model with the given data

clda.model(time_series_data,label_time_series)
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